

WHAT IS CLAIMED IS:

1. A method of producing an assembly comprising at least one component, said method comprising:

mapping the at least one component and thereafter electronically displaying at least one three-dimensional actual model representative of the at least one component based upon said mapping;

comparing the at least one actual model to an electronic display of at least one three-dimensional authority model;

altering a position of at least one of the at least one actual model and the at least one authority model based upon said comparing such that the at least one authority model and the at least one actual model at least partially align;

performing a machine operation on the at least one component based upon the altering the position of at least one of the at least one actual model and the at least one authority model; and

dynamically displaying the at least one actual model such that the at least one actual model is automatically and repeatedly updated as the position of at least one of the at least one actual model and the at least one authority model is altered and the machine operation is performed.

2. A method according to Claim 1 further comprising designing at least one electronic three-dimensional authority model of the at least one component before mapping the at least one component, wherein the at least one authority model is based upon at least one feature of the at least one component.

3. A method according to Claim 2, wherein said designing comprises designing at least one authority model based upon at least one authority feature of the at least one component and at least one attributed tolerance, wherein said mapping comprises mapping at least one actual feature of the at least one component, and wherein said comparing comprises comparing the at least one actual model and the at least one authority model based upon the at least one authority feature and at least one attributed tolerance and the at least one actual feature.

4. A method according to Claim 1, wherein the at least one actual model comprises at least one actual model data set, wherein the at least one authority model

comprises at least one authority model data set, and wherein said comparing comprises determining a best fit of the at least one actual model with the at least one authority model from the at least one actual model data set and the at least one authority model data set.

5. A method according to Claim 1, wherein said mapping comprises mapping the at least one component based upon a location and orientation of the at least one component relative to a flexible tool, wherein said comparing comprises comparing the at least one authority model and the at least one actual model based upon the location and orientation of the at least one component.

6. A method according to Claim 5, wherein comparing comprises comparing the at least one authority model and the at least one actual model further based upon a temperature of the at least one component a temperature of a local environment of the at least one component.

7. A method according to Claim 1 further comprising fabricating the at least one component before mapping the at least one component.

8. A method according to Claim 7, wherein fabricating the at least one component comprises generating at least one numerical control program from at least one three-dimensional authority model and thereafter machining the at least one component based upon the at least one numerical control program.

9. A method according to Claim 1, wherein said comparing further comprises automatically and repeatedly comparing the at least one actual model and the at least one authority model as the machine operation is performed.

10. A method according to Claim 1 further comprising repeatedly transferring data representative of the at least one actual model while dynamically displaying the at least one actual model, wherein transferring comprises transferring the data to a remote location.

11. A system for producing an assembly comprising at least one component, said system comprising:

at least one metrology device capable of mapping the at least one component;
a workstation processing element capable of electronically displaying at least one
5 three-dimensional actual model representative of the at least one component based
upon the mapping of the at least one component, wherein said workstation processing
element is capable of comparing the at least one actual model to an electronic display
of at least one three-dimensional authority model, wherein said workstation
processing element is capable of altering a position of at least one of the at least one
10 actual model and the at least one authority model based upon the comparison such
that the at least one authority model and the at least one actual model at least partially
align; and

a numerical control apparatus capable of performing a machine operation on
the at least one component based upon the altered position of at least one of the at
15 least one actual model and the at least one authority model,

wherein said workstation processing element is capable of dynamically
displaying the at least one actual model as the workstation processing element alters
the position of at least one of the at least one actual model and the at least one
authority model and as the numerical control apparatus performs the machine
20 operation such that the electronic display of the at least one actual model is
automatically and repeatedly updated as the position is altered and the machine
operation is performed.

12. A system according to Claim 11 further comprising a computer-aided
25 drafting and manufacturing element capable of designing the at least one authority
model of the at least one component based upon at least one feature of the at least one
component.

13. A system according to Claim 12, wherein said computer-aided drafting
30 and manufacturing element is capable of designing at least one authority model based
upon at least one authority feature of the at least one component and at least one
tolerance, wherein said at least one metrology device is capable of mapping at least
one actual feature of the at least one component, and wherein said workstation
processing element is capable of altering a position of at least one of the at least one

actual model and the at least one authority model based upon the at least one authority feature and the at least one tolerance and the at least one actual feature.

14. A system according to Claim 11, wherein the at least one actual model
5 comprises at least one actual model data set, wherein the at least one authority model comprises at least one authority data set, and wherein said workstation processing element is capable of comparing by determining a best fit of the at least one actual model with the at least one authority model from the at least one actual model data set and the at least one authority model data set.

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15. A system according to Claim 11, wherein said at least one metrology
device is capable of mapping the at least one component based upon a location and orientation of the at least one component relative to a flexible tool, wherein said workstation processing element is capable of comparing the at least one authority
15 model and the at least one actual model based upon the location and orientation of the at least one component.

16. A system according to Claim 16, wherein said workstation processing
element is capable of comparing at least one authority model and at least one actual
20 model further based upon a temperature of the at least one component and a temperature of a local environment of the at least one component.

17. A system according to Claim 11 further comprising at least one
machine tool capable of fabricating the at least one component before said at least one
25 metrology device maps the at least one component.

18. A system according to Claim 17, wherein said workstation processing
element is further capable of automatically generating at least one numerical control program from the at least one authority model, and wherein said at least one machine
30 tool is capable of fabricating the at least one component based upon the at least one numerical control program.

19. A system according to Claim 11, wherein said workstation processing
element is further capable of automatically and repeatedly comparing in real time at

least one actual model and the at least one authority model as the machine operation is performed.

20. A system according to Claim 11, wherein said workstation processing
5 element is capable of repeatedly transferring data representative of the at least one actual model as the numerical control apparatus performs the machine operation.

21. A method of producing an assembly comprising at least one
component, said method comprising:
10 mapping the at least one component and thereafter electronically displaying at least one three-dimensional actual model representative of the at least one component based upon said mapping;
comparing the at least one as-built model to an electronic display of at least one three-dimensional authority model;
15 altering a position of at least one of the at least one actual model and the at least one authority model based upon said comparing such that the at least one authority model and the at least one as-built model at least partially align; and
performing a machine operation on the at least one component based upon the altered position of the at least one component,
20 wherein comparing comprises automatically and repeatedly comparing actual model and the at least one authority model as the machine operation is performed.

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